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ABSTRACT

A study examined recent developments in computer and information technology (CIT) training in the United Kingdom to determine those elements of CIT training that could be incorporated into the Youth Training Scheme (YTS). Information for the study was obtained from national and regional officials of the Microelectronics Education Programme (1981-86), teachers, inservice trainers, and other interested parties. Although widely acknowledged as being innovative, the microelectronics program's impact was determined to be very patchy from the standpoint of teaching and learning strategies used in the schools, and it failed to provide adequate support for teachers involved in the program. Scotland, on the other hand, appears to have initiated a more promising method of CIT. Scottish schools emphasize using computers in ordinary school subjects versus England's decision to confine computers to computer studies departments. After examining these and other initiatives and practices related to CIT, the researchers formulated 16 specific proposals for incorporating CIT into YTS programs. The importance of allowing CIT developments to be used differently according to region, industry, area, or local interest, the value of local support groups, and the need for local negotiations over development and implementation were emphasized. (Appendixes include a glossary of abbreviations and discussions of CIT certification schemes and developments in open enrollment.) (MN)

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UNIVERSITY OF SURREY & ROEHAMPTON INSTITUTE
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RESEARCH IN YOUTH AND FURTHER EDUCATION

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DEVELOPMENTS IN COMPUTER AND INFORMATION TECHNOLOGY EDUCATION AND TRAINING AND THEIR IMPLICATIONS FOR THE YOUTH TRAINING SCHEME

Alan Brown and Julian Mills

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
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1 Briefly the aim of the research is to explore the issues surrounding the development of good practice, standards and progression in the CIT Core Skills. To do this, developments in YTS need to be put in the context of related developments in CIT. For a fuller description see information series paper 1 (background and project proposal). This report is the first in a series of published reports and future reports will include:

- A survey of what is happening in CIT in YTS
- Criteria for good practice in CIT in YTS
- Treatment of standards in related CIT developments
- Standards and progression in CIT in YTS
- Recommendations as to how to promote good practice in CIT in YTS

2 A full glossary of abbreviations used are given in Appendix 1.

3 We would like to thank the many teachers, researchers and advisory staff with whom we made contact for their time and co-operation. The organizations mentioned in the Appendix 1 also gave their full co-operation, as did a large number of others interested in this area, but whom it has not been possible to mention in this necessarily brief scan of developments. Indeed contacts made at exhibitions and conferences attest to the interest and enthusiasm of many of those involved in this field. Finally we would wish to acknowledge the constructive comments made by both our Support Group and the Steering Committee.

4 Besides possible significance for progression into and out of YTS, some of the large-scale initiatives in CIT may have lessons for YTS policy-makers in the scale of their operation and the type of problems that were encountered.

1 INTRODUCTION

This report is the first in a series of information papers produced as an outcome of a research project looking at computer and information technology (CIT) training in the Youth Training Scheme (YTS) (1)(2). Information for this report was collected during an extensive programme of visits and interviews in the period April to August 1986 (3). As with all the information series papers, this report is seen as an opportunity to open up debate about CIT education and training.

This report focuses upon a number of issues relating to recent curriculum developments in CIT and also looks at a number of local initiatives and examples of good practice. The former are addressed to put developments in YTS in a broader context (4), while the latter may well have significance for implementation issues in YTS. Also it should be remembered that this report is dealing with processes, outcomes, problems and successes of the development process, and that issues concerning standards and progression are to be the subject of a future report.

As the project is concerned with development in its broadest sense, then all aspects of the curriculum development process will be addressed: aims and objectives, design, implementation and evaluation. Further, it is intended that the project should facilitate the development of a CIT training strategy. To this end the report is organised on a text and commentary basis, whereby major findings, recommendations and alternative proposals are presented in the text, while further detail is given in the commentary.

It should be emphasised that this paper is intended as a contribution to a debate about policy. It is short and it is to be hoped will be more widely read than a longer report. However, brevity does mean that arguments are not always fully elaborated and for this reason the authors would be happy to give further clarification/expansion of their arguments/sources etc to anyone who is interested.

5 It should be remembered that the Department of Trade and Industry launched its own programme to enable schools to buy a computer effectively at half price just prior to the launch of MEP. The net result of both programmes was that while virtually all schools obtained computing equipment and large numbers of teachers received some initial training in the use of computers in education, this was often just a veneer and HMIs reported that there had often been little change in schools over the five year period.

We contacted national and regional officials of MEP, as well as talking to teachers, in-service trainers and other interested parties. It was felt that MEP often had more effect in primary rather than secondary schools. The educational structure of primary schools with their more open-ended approach to the curriculum meant they were often in a better position to explore opportunities using computers which went across the curriculum, perhaps on a "project" basis, rather than being constrained by the more formal lesson structures common in secondary schools. They also made better use of current in-service trainers, rather than setting up a separate organization as happened for secondary teacher support.

6 The level of support offered to teachers was often a critical factor. Thus ease of access to and support from an MEP regional centre, an institution of further or higher education with an interest in the field or a supportive local authority could help the formation of a "critical mass" of teachers interested in CIT. Membership of national organizations such as "Micros and Primary Education" (MAPE) or involvement with national programmes such as the Open University's "Micros in Schools" Project could complement rather than compensate for more local involvement. The O.U. material included a booklet (Micros in Action in the Classroom, P542CS, 1984) of 29 case-studies of different ways of putting micros in action in the classroom. Either that or "Microcomputers in Education 2" edited by E. Ramsden (1984) could serve as an introduction to those unfamiliar with what is happening in CIT in schools. They should certainly prove an "eye-opener" to anyone still working on the assumption that trainees will have done very little with CIT in schools, except "perhaps a bit of programming and a few games"!

7 This type of training could enthuse and excite, but without support in school the teacher may feel it is an **ideal**, which cannot withstand the **reality** of the classroom. Attention was then drawn to the **value** of advisory teachers who were able to visit teachers **in** school and offer support and make concrete suggestions **about** classroom practice.

Indeed it was widely acknowledged that the cascade model of dissemination, whereby an attempt was made to train key personnel, who would then train others back in their authority and eventually other teachers in school, met with only very limited success. This is perhaps not surprising given the gross under-training of the teacher-disseminators (often 30 hours or less: similar personnel in France and Switzerland, for example, would now receive up to 400 hours spread over a number of years).

8 The number of computers per school was such that pupil access was seldom other than very occasional. Purchase of software had to compete with all the other demands on what were often very tightly constrained budgets.

9 The U.K. was in the period of MEP probably more involved in computing in schools than anywhere in the world.

Indeed MEP could be regarded as a useful pump-priming exercise in promoting the use of computers in schools. However, a much more comprehensive training programme would be required to consolidate such a beginning. There must be doubts whether existing arrangements will be able to deliver such a consolidation.

10 This trend is accentuated if one considers the enormous boom in the purchase of computers for the home, mainly used by children, which was sparked off at the same time. Many of these computers were purchased at least partly for "educational reasons", even if they were subsequently mainly used for playing games.

11 It should be remembered, however, that training of trainers itself would be only one element of making CIT training provision more effective. There should also be a readiness to address **organizational** issues. For example, Chandra draws attention to the inter-relationship between leadership styles, organizational constraints and attitudes in P. Chandra "The Implementation of Computers in a Secondary School" (Surrey, 1986).

2 RECENT MAJOR CURRICULUM DEVELOPMENTS IN CIT:

2.1 Microelectronics Education Programme:

The scope of the school Microelectronics Education Programme (MEP) (1981-1986) was very wide, but its impact in terms of teaching and learning strategies used in schools has been very patchy (**5**). Some schools and particular areas became heavily involved in CIT and were considered highly successful (**6**), but for most pupils their exposure to and involvement with CIT is still very limited.

Some of those closely involved with MEP identified two major problems in relation to training and resources. Teachers typically received just a few days off-the-job training, but when they returned to school they were largely "on their own" (**7**). More comprehensive teacher education and training clearly has major resource implications as does provision of adequate hardware and software facilities (**8**). However, without these the full benefit of CIT facilities and opportunities for learning could not be realised.

Any overall assessment of MEP should take into account that it was an innovative programme that was breaking new ground (**9**). It did help overcome the anxieties many **adults** (teachers) had when faced by the introduction of computers. It did also give most pupils some direct "hands-on" experience of computers (**10**).

From the perspective of YTS, however, a number of important lessons can be learned from MEP about attempts to promote CIT as part of a national programme. These are as follows :

- training needs to be effective not just exciting: training courses can enthuse, but support also has to be offered at the work place. The requirement for effectiveness means that **evaluation** of the training should take place, and that resources need to be allocated for that purpose (**11**).

12 The success of "adventure games" such as "Mary Rose", "Saqqara", "The Tombs of Arkenstone" and "Treasure Islands (Spanish Main)" in eliciting group co-operation and explicit discussion of problem-solving strategies is well-documented. (see both O.U. material and Ramsden previously mentioned and/or "The child, the teacher and the micro-using simulations in the classroom" B. Holmes et al, '85). These "major projects" also make explicit their intention to improve communication skills and to develop transference of knowledge. We have renamed them "major projects" simply to try to overcome the prejudice of some people towards "playing games" (perhaps because of connotations with "space invaders").

13 It is notable that states/regions/provinces elsewhere have been able to generate substantial commitment in some cases to these more localised plans (e.g. West Germany, Switzerland, Canada all have wide differences in CIT provision).

14 Scotland may be seen as a special case which has already started to go down this road. However, in educational terms Scotland is a fairly homogeneous nation (region). This is not always the case with the English regions: sometimes they represent administrative amalgams, and the degree of co-operation or agreement on either philosophy or practice between constituent authorities is sometimes low. Thus care should be taken over the initial choice of area, region or locality.

15 These need to be viewed in the context of the large-scale curricular changes introduced both for 14-16 and 16+ education. The Munn and Dunning reports, together with national Action Plans have heralded major changes in the Scottish education system for these age groups. The place of CIT within the modular system was therefore given considerable thought. This coupled with the separate organization and development of the Scottish Microelectronics Development Programme (SMDP) means that development in CIT in Scotland has taken a very different path to that in England and Wales. Indeed the debate about progression and how different types of provision inter-relate has been taken much further, and there is a clearer sense of overall direction and purpose. It is also perhaps noteworthy that the funding of SMDP is on a permanent basis. Providers can therefore be sure of continuing support. This was not always the case however, for when SMDP was launched as a pump-priming agency in 1979 its initial level of funding from the Scottish Education Department was a modest £320,000.

16 comment from Depute Director of SCET.

17 Among the titles that may be of interest to Vocational trainers are :
The "New Community" suite. This includes titles New Town Sites, Sewage Works, House Match. These could be used to reinforce the core skills element of YTS schemes in the caring industries, council works, building industries.
"Catch" a decision making exercise based on the fishing industry.
"Holiday" a simulation of a travel agent booking system, but also of interest to trainees in the Hotels industry.
"Car hire" a simulation of a small car hire firm.
"Drover" a simulation of eighteenth century droving.
"Airline reservation" a real time simulation of a bookings system.
Plus other titles that can be used to reinforce basic skills for trainees that need extra help.

These are available from the marketing division of SCET, "SCETLANDER". (74 Victoria Crescent Rd, Dowanhill, Glasgow G12 9JN) In Scotland they are provided free of charge to schools.

- work with CIT can be utilized to deliver other desirable learning outcomes: for example, working co-operatively in teams (**12**).

- national plans will be picked up differently according to region, area or local interest (**13**). This should specifically be allowed for within the overall policy. Indeed only through such decentralization is the commitment likely to be forthcoming at all levels to make implementation effective (**14**).

2.2 Developments in CIT in Scotland: (15)

Experiences at school

The features of most interest in the use of CIT in Scottish schools was the emphasis on the use of computers in ordinary school subjects as a contrast to the secondary experience in England where the computers are frequently physically linked together in a network and locked up in the "Computer Studies" department (**16**).

The Scottish Council for Educational Technology (SCET) has produced a number of computer programs, mainly for the BBC computer, for use as stations in a "circus" of activities or a focus for group activity and discussion (**17**).

Computer use in this way provides an efficient use of scarce resources, a working example of the utilitarian nature of computers, as well as overcoming initial fears of computers.

With the advent of TVEI it is to be expected that SCET or a similar organisation based on FE will be able to provide resources for vocational courses. This is not a matter of writing programs but of compiling relevant data for use in database, spreadsheet, and possibly wordprocessing files. (This relates to the intended vocational bias of non-advanced education in Scotland).

18 There are moves to allow for modules at non-FE commercial training organizations to be validated by SCOTVEC in some cases. Validation by SCOTVEC is quite a difficult process for a commercial training provider. This whole area is also an issue of concern for FE staff. Subsequent reports will return to this theme.

19 Some of the learning outcomes of the later modules can be quite sophisticated. For example, "Can formulate a yearly financial plan for the (agricultural) enterprise unit."

20 Can all of the "outcomes" be assessed at the college? Should the tutor visit the placement or accept the judgement of the placement supervisor? Will supervisors be assessed as to their competence to make such judgements?

Examples and counter examples were given by college staff. Thus in 66017 Practical Caring Skills: The Elderly
"The difficult part of this module is to get half of the trainees to pretend to be old people."
64849 Introduction to the Mining Environment.
Could this be done in a classroom? Whereas you could realistically make a souffle, a brick wall or cast a die in a suitably equipped FE kitchen or workshop. Can you operate a microcomputer in as realistic a way?

The SCOTVEC 16+ modular system

In Scotland most of the non-advanced further education is done via the 16+ National Certificate (Action Plan) Modules. These modules (over 2000) cover a wide range of vocational areas. They replace in Scotland all of the previous non-advanced vocational qualifications.

They are available at many age levels; in school as part of TVEI, as part of the FE based off-the-job training in YTS, as the FE part of day release or block release, or for adults returning to training in FE after unemployment or to upgrade their skills (**18**) It offers a very flexible and comprehensive framework.

In principle, a student could select any set of modules for his vocational training. Usually the trainee is guided by a personal tutor in FE and a training supervisor to help with such selections. The student is also constrained by the limitations of the FE timetable but it is possible to take different modules by moving between different colleges. The time-tabling aspects of the Action Plan modules are seen as a difficult but soluble problem for FE departments.

The modules themselves are not graded in difficulty but later modules do have a list of modules or grades that are "suggested" pre-requisites. The modules, which are taken over a notional 40 hrs, are criterion referenced to (usually) five "learning outcomes" which are continually assessed by the students normal trainer/tutor (**19**). The assessment is either by observation of the practical performance of a task or by special tests made up (and accepted by SCOTVEC) by the trainer/tutor.

The modules are intended to be delivered in a student centred, practically based style.The assessment of practical performance "on-the-job" is an area at present under study. The key question of who assesses work based practical performance: FE staff or work based supervisor?(**20**) remains to be settled, but nearly all are convinced that many practical outcomes can be most sensibly assessed "on-the-job".

21 Some of the "learning outcomes" from the prefix 6 series of the modules could be edited with practical "industrial relevance" in mind. However, they might argue that "knowledge **about** computers" is a crucial element of an introductory course (eg know the reason for the growth of computer use, know the use of computers in meeting the needs of different categories of users, know the components (processor and peripherals) of a microcomputer system).

22 It would seem worthwhile to provide a central production unit or register of industrially relevant material that can be called on by FE tutors.

23 A large number of non-clerical trainees would have a limited exposure to **practical** use of (for example) wordprocessing and dataprocessing. Many trainees, in 60 hours of CIT, would take 61091-Introduction to Computers ("a general module aimed to give the student confidence in using a variety of software and hardware") plus perhaps 61095- Introduction to Computer Applications ("a general module which introduces the student to the nature of applications packages and their implementation").

In order to get a wider variety of experience in the CIT area the time spent on the introductory modules could be cut down from forty to twenty hours. This could perhaps be done by cutting down some existing modules and providing some new half modules:
(eg 61091 reduce scope of the "know the ..." learning outcomes and present it as a half module).

The remainder of the time could then be spent on other **applications/data using** modules (for example, Dataprocessing, Spreadsheet applications, Electronic mail and Informatics, Computer Aided Design (Technical Drawing),Computer Aided Design (Lettering and Graphic layout for Advertising) etc from which an industrially relevant selection could be made.

Use of 16+ National Certificate Modules in YTS

On a YTS scheme with a recommendation of 60 hours training for CIT, the trainee will cover at most two modules. The off-the-job training will be based at FE. There are non-FE commercial providers of off-the-job training, but their certification is done outside the scope of the 16+ National Certificate.

The modules were designed with no particular industrial bias built in but with a clear direction that it was expected that the practical exercises would be done in a manner that would promote industrial relevance.(21) It was intended that software and data selected in such a manner would make clear the application of the technology to the trainees industry.

Many FE tutors have risen to the challenge to make their CIT courses industrially relevant. But due to the flexible nature of the Action Plan module structure they may be faced with a group of trainees with several different industrial backgrounds. They will certainly be at different sections of the module, or even working on different modules. It is not difficult to imagine a situation where it would be impossible for an FE tutor to prepare enough material to make CIT module relevant for each student (22).

A strength of the modular system is in its ability to provide modules that form a foundation for training at a higher and more profound level. The majority of YTS trainees may have no further training in FE (1984 Labour Force survey) so a consequent disadvantage of this system is that it fails to provide a wider variety of experience of some of the crucial applications of microcomputers to the world of work (23).

2.3 GCSE:

It is clearly too early to make judgments about the extent to which the new GCSE is successful in developing process skills like problem-solving, information-handling etc. However, the introduction of GCSE does have two major consequences. Firstly, the **intention** is in general to produce a shift in the type of education typically received by the secondary

24 There is an attempt to provide a coherent pattern of training to support the innovation of TVEI programmes. This included more systematic proposals about teacher support and the planning of "tailored" in-service training.

25 A future report will deal with the issue of standards and progression.

school population and in particular to increase the emphasis on practical activities and competence. Philosophically at least education and training systems are moving closer together. Hence the degree of **resistance** in the system as a whole to the type of approach outlined in Core Skills in YTS Part Two: Computer and Information Technology (the "blue book") may be expected to lessen.

Secondly, the alignment between those basic process skills and those of the YTS Core Skills (problem solving; finding out skills etc.) should seek to strengthen links between core skills and CIT activities.

2.4 **TVEI:**

The development of TVEI also represents an attempt to bring about curricular change. The intention being to provide more vocationally-oriented opportunities at school, thus broadening the curriculum opportunities for 14-18 year olds.

The use of work experience and the expectation that computer literacy would typically be one of the general characteristics of the curriculum that could exist are likely to be of interest in relation to CIT in YTS.

Diversity of approach in curriculum development is explicitly encouraged under the auspices of the TVEI programme: this means that a broad degree of collaboration from various agencies is required from the very start of any local programme. While it is too early to judge how successful the programme has been in promoting coherence and integration of personal development and occupational competence, a number of facets of the programme do have significance for CIT in YTS.

Three components of development of TVEI are especially noteworthy: the existence of complementary training (**24**), the local negotiation over details of how schemes are to be implemented and the specific ear-marking of funds for evaluation. As the numbers of pupils undertaking TVEI programmes expands, then their experiences in CIT will have to be increasingly taken into account with regard to the type of activities undertaken in CIT in YTS (**25**).

26 Published in May 1984.

27 Each expert wants their own "key" area included.

28 Only 9 of the 28 sub-objectives were unequivocally active.

29 And IT was only one of ten proposed core areas!

30 Significantly, even the main aim was changed so as to stress the practical dimension: " to provide an appreciation of the implications of IT for society and the individual and to introduce the young person to the applications of IT" was changed to "to develop appreciation of the implications of IT for society and the individual and to provide the opportunity to acquire a practical introduction to its basic applications."

31 "Supporting IT in CPVE" FEU, 1986.

32 "In the majority of establishments IT objectives were being delivered by IT/computer specialists rather than by other subject teachers" op cit.

33 op cit. This was also seen as critical by most countries who were intent on developing "double competence" of teaching staff, but perhaps most notably in France and Switzerland.

34 It should be remembered that the criticism made of the CPVE "IT expert" development process was exemplary of the common (almost universal!) phenomenon rather than a particular criticism. Indeed the recent curriculum development process undertaken by BTEC in relation to their Higher National courses in "IT", "Business IT" exhibited similar, almost obsessive, concern with the content. Broader issues about prior learning or work-based learning and accreditation received relatively little attention, although it was recognised that these were potentially very important. However, once again, if these issues are not addressed at this stage, then notions of specialist expertise are reinforced, which will make it harder to accommodate such changes at a later date.

2.5 CPVE:

The development process associated with the core area of IT in CPVE is particularly interesting. The initial attempt at delineation of the IT core was in many ways typical of the "expert" approach to curriculum development. A collection of experts were assembled and given the task of producing a draft curriculum for the IT core for inclusion in the initial CPVE consultative document (**26**). As so often with this method, what was produced was wide ranging (**27**), heavily knowledge based (**28**) and the amount of material expected to be covered was immense (**29**).

Attempts were made to overcome these problems during the consultation process, and major changes were made in relation to each of the criticisms made above (**30**). It could be argued that the consultation and piloting processes are there precisely to iron out such difficulties, but a more fundamental criticism could have been about the starting point itself. The initial heavy concern with content acts to structure subsequent events, even criticism, and it was hardly surprising that the evaluation of IT in the CPVE pilots found "generally IT was being treated as a special core area rather than being integrated across CPVE" (**31**).

In addition, the "expert" or specialist input in the development stage was mirrored at implementation (**32**). The evaluation also highlighted the criticality of staff development "especially if non-specialist teachers are to acquire sufficient confidence to participate" (**33**).

The way IT in CPVE is now developing also appears consonant with the CIT strategy for YTS. It is clear that FE, as with schools, are making great efforts at providing a general, but practically based, introduction to IT. However, the major lessons for YTS concern strategies for the involvement of non-specialists in IT and how it would be more appropriate to involve them prior to implementation (**34**).

35 That is, the sheer volume of what "has to" be covered itself operates as a barrier to learning.

36 The argument that different industries should perhaps follow different lines of development of CIT training within YTS is taken up in a future report.

37 That is not to say that concerns about resources, content, organization etc are not important: satisfactory resolution of these issues may be necessary but they are not in themselves sufficient.

38 For example, Papert suggests that the development of procedural thinking; the ability to "debug" procedures and modularize problems constitute "powerful addition(s) to a person`s stock of mental tools".

Papert argues that when used well, working with the new technology can open up a revolution in ideas, generating "new understandings of the process of learning itself". Thus "true computer literacy is not just knowing how to make use of computers and computational ideas. It is knowing when it is appropriate to do so".
S. Papert "Mindstorms" Harvester, 1980.

2.6 Overall comment about major curricular initiatives:

- any such scheme will be mediated before it reaches the intended recipients, hence it is vital to find a strategy **interesting** to those mediators: in the case of YTS, the mediators will be tutors, trainers and supervisors.

- the illusory attraction of "order": the temptation to tidy up systems, to seek syllabuses or schemes covering what all people **should** learn even if these greatly interfere with what they do learn (**35**). Yet the "real world" is untidy, there are many different sources of reference and "disorder" need not be dysfunctional, if it leads to an appreciation that circumstances and contexts may be very different, with a consequent adaptation of approach (**36**).

- a major problem facing such schemes relates to peoples attitudes (**37**). It should be recognised that consent and commitment to these ideas needs to be "won". Those involved with YTS at all levels need to be convinced of the value of the CIT strategy.

- while CIT activities can be separately identified, at another level of analysis skills in these areas cannot meaningfully be separated from broader learning outcomes relating to communications, problem-solving etc. (**38**).

39 Although developments previously mentioned (most notably the replacement of GCSE and CSE by GCSE and the extension of TVEI from a pilot to a permanent national programme) will bring about curricular changes in both the short and long-term, the authors thought it appropriate to include this section on what was happening in schools up to summer 1986. This was considered important for two reasons. Firstly, this gives an overall picture of the type of CIT experience which existing YTS trainees may have had at school. Secondly,those with the responsibility of implementing the proposed curricular changes will also have to take cognisance of existing practices - not least because these will be their point of departure and **practices** in the classroom take much longer to change than aims and objectives!

40 See, for example, the work of Kings (Chelsea) College on Computers in the Curriculum. The BBC Domesday project would also seem to open up rich opportunities, although many prospective users may find the cost of the videodiscs prohibitive.

41 The spread of both TVEI and CPVE (see previous section) is starting to undermine the narrowness of focus upon examined courses in computing. I.T. as a subject in its own right is also becoming more popular.

42 Syllabus content of AEB "Basic Test in Computer Awareness":

1) Uses and limitations of computers in modern life.
2) Current trends, their economic and social implications.
3) Computer systems.
4) Programs.

43 Whether its knowledge based approach will be able to hold the interest of its target group as well as a more thorough-going applications-based approach is debatable. However, given limited access of these pupils to computers, due to the precedence often afforded to those doing "computer studies", it is probably realistic. Similarly it is debatable whether too much concern for this as a qualification is appropriate as a major component of CIT experience in YTS. It could be used in conjunction with a practically-based approach, but should not be used in place of such an approach. This is, of course, a criticism of the way the test is used (misused) rather than of the test itself. The significance of this type of qualification in relation to progression into and out of YTS will be more fully discussed in a future report.

44 Applications typically refer to wages, stock control, hotel and airline booking etc.

45 TVEI tries to overcome this to some extent by use of work experience. Although pressure to find suitable placements is already intense.

46 Certainly the GCSE was intended to have a much stronger emphasis on practical applications.

3 SPECIFIC CURRICULAR DEVELOPMENTS IN CIT IN TERMS OF COURSES AND QUALIFICATIONS

3.1 Experiences at school (39)

CIT can be used right across the curriculum and there have been a number of encouraging developments(**40**), but undoubtedly the main usage of computers in secondary schools has been in the provision of computing courses. Three types of qualification have typically been available to 16 year olds: the focus being "computer studies", "use of computers" or a "basic test in computer awareness"(**41**).

Philosophy behind the basic tests is that the tests in this series should provide a basic qualification for those about to leave school, especially if they are likely to have few other qualifications.

It is firmly knowledge-based, and practical work is not formally tested, although it is expected that candidates will have "adequate practical experience of using computers". Alongside such practical work, it deals with a broad appreciation of uses of computers, their implications as well as some technical details of their operation (**42**). This more general approach, clearly with an educational focus, would seem to complement an applications-based, more occupationally oriented treatment of CIT in YTS (**43**).

Some of the now to be replaced CSE exams, aimed at the same target group, focussed more on applications (eg as with the "Use of Computers"). The problem here, however, is that the applications may be premature in terms of the pupils experience (**44**). This may mean that one of the key benefits of an applications-based approach (its relevance) is lost (**45**).

The "computer studies" courses have traditionally tended to be rather technical, knowledge-based and often including a fair degree of programming (**46**).

Pupils undertaking these courses have often had the "lion's share" of access to computing facilities. Insofar as these trainees enter YTS (as these courses have often been a minority option), they should present no particular problems. CIT in YTS should be able to offer a different type of insight into computing.

47 Many, but by no means all, may have used computers in isolated lessons in secondary school. School-leavers will increasingly have also had some experience at primary school.
The significance of home-computing for anything other than game-playing is sometimes overstated.

48 Although Fitzgerald showed in "New Technology and Mathematics in Employment" that such "fear" is rapidly overcome even for these groups, when faced with an application they can readily understand.

49 Typically aimed at 11-13 year olds, the intention is to give **all** pupils an awareness of computing, such that they can take any subsequent opportunities that arise and are able to imagine how and where CIT can be used to solve particular types of problems that arise.

50 Compare the way TRADEC courses, developed by the Yorkshire and Humberside Association for Further and Higher Education, sought to integrate "general studies" with the occupationally specific by choice of a topic which bridged the two spheres. ("An Evaluation of Trades Education Schemes" K. Evans and A. Brown, 1983).

51 It should be remembered, however, that this is a trend rather than a complete change. Theoretical and contextual knowledge will still be taught.

52 Although use of a recording matrix, as suggested in the next section, would reduce this risk still further. General applications could include use of bar-codes, monitoring processes, machine control, inventory stock control, and information retrieval.
There may also be educational CAL applications, whereby computers are used to explore ideas not possible by other means ("what if" scenarios; planning; modelling etc.) The whole emphasis on this type of work is to build up practical experience and confidence in using CIT, not to teach technical details of computers nor how to program.

What it does mean, however, is that provision should be made for trainees to take "different routes" through available materials.

However, the largest group of YTS entrants have no formal qualification in CIT nor will they have undertaken a course in CIT of any description (**47**). They will probably have just enough experience and awareness of computers not to have the "fear" often associated with older generations (**48**), but little practical experience. Perhaps the most significant change for YTS is not in examination courses but in the introduction of "computer awareness" courses lower down the school (**49**). If these courses spread, as seems likely, increasing numbers of entrants to YTS will be "computer literate", although for the foreseeable future their practical experience of CIT is likely to remain limited.

Overall then, there are three distinct trends in computing in school and all three would seem to be compatible with the philosophy which currently underpins CIT in YTS. Firstly, the move towards "computer awareness" for younger age-groups.

This means that some of the broader concerns about the development of IT will be considered by everyone as well as formalizing the provision of "hands-on-experience". This should free others in subsequent courses to narrow the focus progressively, such that general sessions on "social implications of CIT" would be unnecessary, although such issues could be undertaken in relation to the **particular** application being worked upon (**50**). Secondly, the move towards practical applications would similarly be consonant with what should happen in YTS (**51**). These applications are likely to be of a more general kind, hence there would be little chance of duplication (**52**). Finally attempts are being made by examining bodies to introduce or at least move towards criterion-based assessment: again this is just a trend and considerable development and refinement needs to take place, but it does mean that consideration of competence is very much on the agenda of large parts of the education and training system.

53 Findings from the RSA CLAIT project (completed August 1986) will feed into some of our other project reports, but perhaps we should just draw attention to the way the pilot CLAIT schemes gave little or no recognition to the potential of on-the-job assessment. ("Assessing Computer and Information Technology Core Skills", RSA, 1986).

54 This discrepancy about on-job assessment can partly be accounted for by the later development of the diplomas and certificates. While only a matter of months, it reflects their readiness to respond to the requirement of the Review of Vocational Qualifications (RVQ) for greater recognition and accreditation of work-based learning. However, the debate as to whether CIT should be treated separately from or integrated with occupational skills remains an important issue and it is one we shall return to in a future report.

3.2 Initiatives from the RSA:

The CLAIT scheme of RSA is perhaps the development most directly relevant to YTS. However as this was the subject of a separate MSC-funded project, little more needs to be said here except that CLAIT does appear a suitable vehicle for assessment of progress on CIT in YTS (**53**). See Appendix 2 for further comment upon the scheme itself.

Although interestingly the separatist approach of CLAIT, whereby achievement in CIT is assessed and accredited separately from occupational competence, contrasts with the integrationist approach of RSA in its new diplomas/certificates in office procedures and retail distribution. In these, computer literacy skills are integrated with other skills and knowledge through the performance of tasks. There is also a greater readiness to accredit on-job learning and experience (**54**).

Another RSA development of direct relevance to YTS is the modular information technology scheme for teachers and trainers. There are routes which can lead to a certificate or a diploma, but there is also scope for a profile memorandum covering just those elements chosen. Less formally, there are various support networks which offer a means of exchanging ideas, good practice,software as well as occasionally producing journals. Such networks seem vital in sustaining practitioners and the encouragement of similar networks for those involved with CIT in YTS should be given a high priority.

3.3 Other Developments:

There have been a plethora of initiatives in CIT recently. There is not space in this report to consider all these, but further details are provided in Appendix 2 upon those most potentially relevant to YTS. Another development of possible significance relates to the increasing interest in Open Learning. A discussion of open learning as it might relate to CIT in YTS is therefore given in Appendix 3.

55 "Girls and information technology" EOC, 1985.

56 For example setting up positive role models for girls in IT; use of advisory staff; importance of training support.

57 "When Croydon decided to initiate a project to produce a syllabus for IT it was decided to use the expertise and experience of practicing teachers as far as possible", op cit.

58 op cit.

59 While it is too early to give a thorough review to the success of the scheme, commitment to the implementation of policy could perhaps be demonstrated in one of the examples quoted: after a year of IT classes at one girls school, pupils made their option choices "out of a total of 160 girls, 20 chose Computer Studies and 70 chose IT to exam level." op cit.

60 Secondary Mathematics Individualised Learning Experience.(SMILE)

61 for example working on the usefulness of LOGO in breaking gender stereotyping about working in maths and computing.

62 The SMILE "organization" has placed emphasis on women teachers working with computers, and hence ran women-only computer sessions in workshops. The SMILE approach of individualized work taken from a detailed and clearly defined network has produced outstanding results in mathematics for girls: ILEA Research and Statistics branch have evidence of equality of performance of girls and boys at both CSE and GCE "O" level using SMILE based assessment.

4 LOCAL INITIATIVES AND EXAMPLES OF GOOD PRACTICE:

The earlier section on national initiatives stressed the importance of allowing substantial regional and local involvement in both development and implementation. This section will give examples of developments upon such a scale, and how these have been successful in gaining a high level of commitment "on the ground". The scope of this section is potentially very wide, but we will focus upon three examples which demonstrate the point about the significance of local work and also deal with issues which will be of substantive interest to the development of CIT in YTS. These three areas are as follows: attempts to combat gender stereotyping, how to disseminate "good practice" and how to keep track of individual experience and achievement.

Combatting gender stereotyping

The London Borough of Croydon were commissioned by the Equal Opportunities Commission in 1983 to produce a report on IT in schools, with particular reference to the effectiveness of IT teaching to girls. Croydon had designed and implemented a 3 year IT course for 11-14 year-olds. An EOC report published in December 1985 sought to evaluate guidelines for good practice in the IT curriculum (**55**).

Besides highlighting a number of other issues which will be of relevance to CIT in YTS (**56**), attention is drawn to the use of teacher **support groups**. From the outset, practitioners were involved (**57**). They met once a week and "discussed material, syllabus, teaching strategies and new areas of technology" (**58**).

Besides feeding through to the authors of the new IT syllabus, the teachers themselves became more confident about the new course (**59**).

A remarkably similar picture has been obtained by the SMILE (**60**) group in London. Full-time project staff are involved (**61**), but the heart of the scheme around which all else revolves is the organization of practicing teachers and the mutual support they offer each other (**62**).

63 Innovation and Development exchange (INDEX).

64 The system allows for sophisticated interrogation and it is intended to provide links to every ILEA school.

65 Not only for use of those involved with SMILE but also for those interested in topics such as Graded Objectives in Modern Languages (GOML)

66 Indeed, users should be able to choose which type of avenue they went down: eg whether to contact or get involved with others on a geographical, industry or interest basis.
It is noteworthy that over the last couple of years that FEU have made substantial efforts to support those involved in CIT in colleges. "Information Technology in Further Education" (FEU, 1984) had revealed that "the picture emerging has a disturbing reality". However, since then support has been greatly increased: FEU has produced courseware materials, strategies for staff development and examples of application of IT in the organization and management of colleges. The DES earmarked specific funding for IT in colleges through the Educational Support Grant, with copies of all courseware developed through this means being stored with the FEU. Activities have mushroomed at national and regional levels, at a general level, on a subject basis and according to type/level of course. The work of the FEU in this area has therefore been quite extensive, and they should be approached directly for further details [FEU, Elizabeth House, York Road, London SE1 7PH].
However, there is one recent development which may be of potential interest: in November 1986 a new national electronic network for vocational education and training was launched - ResCue on TTNS. ResCue is supported by FEU's Regional Curriculum Bases and offers practitioners opportunities to share and develop ideas, contacts, examples of good practice and news of any recent initiatives undertaken.

67 It started life in 1981 with the acronym GRIP, which has subsequently changed to GRIMACE.

68 Differences in ability are, of course, almost universal in any class setting. However, home computing and Computer Club activities meant the range of experience was also very wide.

69 The tasks are organized into a matrix or network similar to the SMILE network. Each task or set of tasks is allocated a place in the matrix according to its content and level.

70 These include :
- progression in each topic.
- a guide to the comparability of difficulty in different topics.
- making user aware of full potential of possible learning materials and activities.
- allows individuals to enter topics at suitable (and possibly very different) points and progress at own rate of development.

71 Ad-hoc adjustments would be difficult to accommodate on anything other than a very occasional basis, and the temptation would be for the provider to deliver a standard package.

72 This could be by means of a self-complete checklist. Appropriate starting points could then be determined in an initial orientation phase.

How to encourage and support "good practice".

When the Hargreaves Committee investigated current practices in ILEA schools in 1984, they found examples of good practice in every aspect of school work spread throughout the Authorities schools but that there was no adequate means of spreading information or disseminating good practice. They recommended the setting up of an "Information Exchange". The nub of this is INDEX (**63**) Schools and individuals submit details of good practice to INDEX for storage on a computerised database (**64**). However, the emphasis is on an exchange rather than a directory of good practice and the intention is to facilitate practitioners coming together (**65**).

The possibility of such a system being set up would seem to offer substantial benefits in relation to YTS. Besides giving a framework for collecting information, it could also enhance dissemination and give users immediate access to new developments and innovations within their particular field (**66**).

Recording individual experience and achievement in CIT:

Another development of interest comes from London schools and concerns individualized work schemes within computing (**67**). The scheme developed out of an attempt to come to terms with the wide range of abilities and experience of pupils on computing courses (**68**). GRIP sought a way of accommodating such diversity, in allowing pupils to work on their own or in small groups on negotiated **activities or tasks (69)**.

The matrix of topic-areas and levels is by its nature very flexible and has a number of important advantages (**70**). In YTS, especially given the possibility of diversity of backgrounds, experience and placements, it is difficult to conceive how individualized learning can become a reality unless it is contained within such a structure (**71**). The use of a similar structure in YTS would also have to allow for some checking of prior experience (**72**).

73 A discussion paper produced by T.J.Fletcher, HMI on "Microcomputers and mathematics in schools" DES 1983 made this explicit : "much of the very successful development work which has taken place so far has depended on teachers undertaking work far beyond the normal calls of duty, and it is not reasonable to suppose that such methods can become widespread practice."

74 The Core Skills Project demonstrated a depth of commitment to YTS by many of those in the field. Although it also demonstrated the "gap" between those practitioners and those showing markedly less enthusiasm. (See the "Evaluation of the Core Skills Project" by K. Evans, A. Brown and T. Oates to be published by MSC in 1987). Also it should be remembered that the Project produced 8 work-based projects specifically for CIT in YTS. Copies of these are still available from the Further Education Staff College (FESC), Coombe Lodge, Blagdon, nr. Bristol.

75 See J. Fitzgerald "New Technology and Mathematics in Employment", 1985.

76 For example, J.Self "Microcomputers in education: a critical appraisal of educational software" (Harvester, 1985) argues that "it is not inevitable that computers will be widely used to aid learning, nor that they will be used to good effect in education."

77 For example, as to how much and what type of support users require.

78 The curriculum conference, as an alternative means to generate curriculum proposals rather than relying upon expert-led curriculum development, has been developed by a team at the University of Kiel, led by Karl Frey. It is a working conference of about 15 people usually lasting 5 days, which although it is seeking to generate curriculum proposals deliberately seeks to involve a much wider set of participants than simply "experts". This idea may be taken up in a later paper, but it does seem to offer the possibility of a real contribution to debates about the direction CIT should take in specific industries. (particularly in relation to the second year of YTS).

5 REVIEW AND SUMMARY:

The lessons from other developments for the development of CIT in YTS can be formulated both in terms of general comment and a number of specific proposals.

General Comment

Recognition that attachment to the type of development work outlined in previous sections is exceptional and cannot be expected to become commonplace (**73**). However, with judicious support and a degree of recognition similar developments could certainly be fostered within YTS (**74**). In the short term, this might accentuate the differences in the quality of CIT between schemes, but only by harnessing the "commitment" of practitioners are improvements in implementation likely to become a reality. Support could flow through a number of channels (according to industry, area, type of provider etc), but what matters is that the end-users feel **supported** by colleagues.

In education and training generally, but especially in CIT, there needs to be a commitment to continuing education, training and updating. Fitzgerald has already shown that nearly all workers readily adapt and learn about CIT in a context which has meaning to them: at the work place (**75**). This means that, above all, CIT in YTS "should seek to leave the trainees with a positive outlook" and a willingness to engage in further education and training as appropriate. This outcome is not inevitable and certain practices may result in a **negative** learning experience (**76**).

The foregoing would seem to argue for CIT strategy in YTS to allow for a high degree of decentralization. However, the precise balance between the centre and the periphery (**77**), the type of activities to be encouraged, trainer support etc. should itself be a matter for wide discussion. One possible vehicle for sorting out these issues and, just as importantly, for generating commitment to the approach adopted is the **curriculum conference** (**78**).

79 It should be remembered that this section is highlighting a number of significant issues for development of CIT in YTS as a result of looking at developments elsewhere. Further details of specific developments both in the UK and abroad are given in the "Summary of findings from EURIT Conference and how these are applicable to the CIT Project". Comment upon issues relating to standards and progression will be the subject of a later paper. Similarly, the survey of current activities in CIT in YTS and the search for "good practice" can be expected to contribute further ideas. These papers will be published later in 1987.

80 The implications of this in organizational terms for MSC would also need to be considered: that is, the role to be played by area or regional staff and the TSAS.

81 That is, focus is upon how software is used, not rigid adherence to a set of predefined criteria. (cf North American experience where certain developers and practitioners have complained of the stifling effect of a centralized product-evaluation system in the USA, where a lack of technical sophistication (for example in use of high resolution graphics etc.) may result in a low overall rating for products, which have been successfully used in practice.

82 Core Skills in YTS Part 2: Computer and Information Technology. (MSC, 1985).

83 These will be delivered as a Project outcome in a later report.

84 This may mean that injunction given in the blue book to cover 3 types of application may not always be appropriate.

Specific proposals (79):

1. importance of allowing CIT developments to be picked up differently according to region, industry, area or local interest.

2. local support groups are invaluable to practitioners and should be encouraged wherever possible.

3. local negotiations over development, implementation and staff training associated with CIT should be encouraged.

4. recognition that involvement with developments mentioned above will be **exceptional** rather than common-place (implicit in this strategy then is the fact that resources should firstly be channeled into facilitating good practice, and a subsequent stage would involve trying to spread such good practice)(**80**).

5. training needs to offer support at the **workplace.**

6. any CIT strategy has to interest the mediators. (trainers and supervisors)

7. consent and commitment to a CIT strategy has to be gained from those involved at all levels of YTS.

8. issues relating to gender stereotyping need to be considered.

9. any evaluation of software should seek to include user-reports about how the software worked in given contexts (**81**).

10. explicit evaluation of CIT training should be encouraged.

11. ideas expressed in "blue book" (**82**) are largely consonant with directions most other CIT developments are taking. More concrete exemplars could assist practitioners in taking up those ideas (**83**).

12. trends in CIT in schools and further education would seem to reinforce the view that CIT in YTS should concentrate upon particular applications, rather than seeking breadth for its own sake (**84**).

13. thought should be given to setting up an innovation and development exchange.

85 Again this is a theme which will be considered in a future report.

86 For example, in relation to problem-solving and working as a member of team. Indeed the relationship between the acquisition of CIT skills and competence in the 4 outcomes of YTS is likely to become increasingly symbiotic. This relationship can perhaps be demonstrated if emphasis is put on the information rather than the technology in I.T.

14. a matrix allowing individual recording of experience and achievement in CIT should be developed to cover topic and level.

15. there should be a debate about the relative merits of a separatist or integrationist approach to the treatment of CIT skills in YTS (**85**).

16. the links between CIT and other learning outcomes should be emphasised (**86**).

APPENDIX 1

GLOSSARY OFf ABBREVIATIONS

AEB	Associated Examining Board
ATB	Agricultural Training Board
BTEC	Business and Technician Education Council
CIT	Computer and information technology scheme (RSA)
CGLI	City and Guilds of London Institute
CLAIT	Computer Literacy & Information Technology
CPVE	Certificate of Pre-Vocational Education
CSE	Certificate of Secondary Education
DES	Department of Education and Science
EOC	Equal Opportunities Commission
EURIT	European Conference on Information Technology in Education
FE	Further Education
FESC	Further Education Staff College
FEU	Further Education Unit
GCSE	General Certificate of Secondary Education
GOML	Graded Objective in Modern Languages
GRIMACE	(new acronym for GRIP): to emphasize "Materials for computing education"
GRIP	General Resource Based Individualized Learning Package
ILEA	Inner London Education Authority
INDEX	Innovation & Development Exchange (of ILEA)
IT	Information Technology
ITeC	Information Technology Centre
LANAC	Leicester & Northants Accredited Centre
MAPE	Micros & Primary Education (Newman College)
MARIS	Materials & Resources Information Service
MEP	Microelectronics in Education Programme
MSC	Manpower Services Commission
NPTC	National Proficiency Test Certificate
OL	Open Learning
OPTIS	Oxfordshire Project for the Training & Instruction of Supervisors
OU	Open University
RSA	Royal Society of Arts
RVQ	Review of Vocational Qualifications
SCET	Scottish Council for Educational Technology
SCOTVEC	Scottish Vocational Education Council
SMDP	Scottish Microelectronics Development Programme
SMILE	Secondary Mathematics Individualized Learning Experience
TRADEC	Trades Education Schemes
TSAS	Training & Standards Advisory Service
TTNS	The Times Network for Schools
TVEI	Training & Vocational Education Initiative
YHAFHE	Yorkshire & Humberside Association of Further & Higher Education
YTS	Youth Training Scheme

APPENDIX 2

Details of CIT certification schemes of potential relevance to YTS.

2.1 **RSA Computer Literacy and Information Technology Scheme**

1) **Name of Certificate**
CLAIT
The cost is £8.00 per candidate.

2) **Type of Assessment**
The certificate is tested at end of course section. Test material is provided by RSA or approved for local use by RSA. The tests are called "assignments" and they are practical exercises, assessed by the tutor and moderated by RSA. The assignments test "objectives" that build up to profiling statements. The tutors are encouraged to set up their own test material that reflects the practical use of computers and information technology in their own industry.

3) **Accuracy Required**
No more than three errors per assignment. Some practical activities have to be completed without error. Candidates can retest assignments at will up to two times.

4) **Who does the Assessment?**
This is usually done by the trainer (called by RSA the Local Assessor), working with a checklist supplied by RSA. A sample of the work is checked by RSA.

5) **When and Where?**
Assessment takes place at the normal training place, which must be registered with RSA as a test centre. Places already registered for RSA, educational or centrally funded training organisations are only perfunctorily checked. Registration is more difficult for independent training providers. The assessment assignments are provided by RSA as and when they are required. The assignments can be locally rewritten, but have to be approved by RSA. (They recommend a 3 month gap between writing and testing to allow for approval by RSA.) The assignments can be administered to the candidates "on demand".

6) **How long does it take?**
A notional time limit of 2 hours is set for each assignment. In practice, most candidates will be able to complete the assignments in much less time.

7) **Areas Assessed**
Assignments cover the following application areas. Wordprocessing, Spreadsheets, Database, Videotex, Business/accounting and Graphics/plotting packages. (The "standard" applications of Wordprocessing, Dataprocessing and Spreadsheets are very good. The other areas are very interesting but they show signs of being developed to suit particular hardware and software).General work on"Computers and Information Technology" is included but it is assessed

in parallel with the other application assignments.

8) **Conclusions**

This seems to be a flexible, well thought out system for the certification of the CIT element of YTS training. It would be suitable for most types of YTS scheme, with the exception, perhaps, of those schemes that have a high provision of "on the job training" for CIT, or where the trainee is taken to a higher professional standard in CIT. The certificate lends itself to a course with a high practical bias, but it is assessed by tutor marked assignments and not by workplacement supervisor judgements of competence. Carping criticisms could be made of the content, but generally this seems well matched to the capabilities of most trainees. Some of the language used in the assignments seems a little advanced for some trainees ("Use the relevant formulae to generate Quarterly Totals","With reference to the data overleaf, set up a file with the following fields:" However, generally the instructions are clear and well thought out.)

2.2 CGLI 726 Introductory Certificate in Information Technology

1) **Name of Certificate**
CGLI 726 : (Most training providers, outside of ITeCs, would probably only be able to produce one or two of the 726 modules for certification.) Another related development is Basic Competence in IT: this is a certificate that represents a particular selection of 726 modules). The cost is £5.00 per candidate per module. In addition, each module costs £10.00. This contains, amongst other things, the objectives for each module and the tests. The tests can be photocopied for each candidate.

2) **Type of Assessment**
Each module is tested after the objectives have been covered and signed in the course log book. Test material is provided by CGLI as part of the documentation for the module. The tests are either practical or written tests (multiple choice or short answer). There seems to be no facility for tutors to produce their own material for the practical tests with a bias towards the industry in which the trainees work.

3) **Accuracy Required.**
Tests have to be completed without error. Candidates can retest at will up to four times. A gap of five weeks is required between practical tests.

4) **Who does the Assessment?**
This is usually done by the trainer. The whole assessment procedure is overlooked by a CGLI appointed Visiting Assessor.

5) **When and Where?**
The course can only be run at Registered centres. These centres must be approved for the 726 scheme, or part of the 726 scheme by CGLI. Approval depends on the premises, allocation of tutors and allocation of suitable extant equipment. The suitability of the tutors is not considered. Assessment takes place at the normal training place. This is usually an ITeC or college. The assessment tests are provided by CGLI with the module documentation. They provide four versions of each written test, as well as the information for the practical tests. A typical module may have three written tests and five practical tests as well as some tutor assessed areas.

6) **How long does it take?**
A notional time limit of 45 minutes is set for each test. In practice, most candidates will be able to complete the assignments in much less time. There are possibly up to ten tests per module.

7) **Areas Assessed**
For the Introductory level certificate, the candidate must have completed the two compulsory elements [Health and safety (free and not assessed by CGLI), Introductory

computers and computing] and then five modules selected from the three disciplines represented: Applications, Programming and Electronics.

(One missing element is Information and Communication applications: eg PRESTEL, Telecom Gold etc : they are referred to in various modules but are not given a module to themselves). You can select up to two from any one discipline. Most of the modules are available but some are to be ready in the near future with one or two "soon". The electronic modules contain :Technical and graphical Communications, Electronic circuits and components, Digital electronics, Electronic systems. Applications and Related Studies include: Office practice and organisation, Word processing, Database methods, Spreadsheet applications, Microcomputer Business applications. Programming and software contain: Coding and programming in BASIC, Coding and programming in COBOL, Coding and programming in Pascal.

8) **Conclusions**

The CGLI 726 Introductory Certificate in Information Technology seems to be a flexible, well thought out system. It allows for work at several levels (introductory, elementary, intermediate and advanced.) It offers a variety of modules over a range of IT related topics. The important question in this context, however, is "How good is the system for the certification of the CIT work done by YTS trainees?"

i. The major limitation is time. Each module is estimated at 50 hrs, even though this is regarded as an over-estimate. This would be very difficult to fit into the 60 hrs that some MAs devote to CIT.

ii. The modules cover material in a **thorough** rather than a **practical** way. It is true to say that CGLI make no recommendations for the way that the course is taught, but the detail and concepts required make the course difficult to teach using exclusively practical methods or emulations of "work practice". This is due to the number of objectives that start with "Describe ..." or "Identify ..". The language seems appropriate to the background of the intended audience (that is, within YTS those trainees who receive fairly substantial CIT experience including those at ITeCs).

iii. For an organisation with a background of CGLI certification for their trainees, with a technical bias to their enterprise, with well-motivated trainees and a clear commitment to training (motivated and prepared staff too) one or more of the 726 modules would be a good choice of CIT certification. For an organisation that has no upper limit to the time spent on CIT related work, with a large CIT content in their day to day business, as well as appropriately qualified staff, the full IT certificate may be possible and desirable.

2.3 TV1 National Proficiency Test Certificate(NPTC)

1) **Name of Certificate**
TV1 (With further certificates TV2, TV3)
For Agricultural/Horticultural trainees the testing **may** be subsidised by the ATB (This would not be as "cheap" as the other certificates.).

2) **Type of Assessment**
Practical test at end of training and **after** industrial experience. The tests themselves are not written so as to be **just** agriculturally oriented, but the **data** for the applications programs is devised so as to be relevant to agriculture. The certificating body are quite happy to accept test material from their test sites that has been developed with a different industrial slant from agriculture.

3) **Accuracy Required.**
100% accuracy is required for the items in the practical tests. Retakes of the test can be taken as many times as is necessary, but you have to pay the fee again each time.

4) **Who does the Assessment?**
The assessment is done by a person who has had significant industrial experience of the skill being tested. These people are appointed by NPTC local areas and must be present for the test procedure. In the case of TV1 this is most likely to be someone from an Agricultural College.

5) **When and Where?**
The test is carried out on demand at a suitably equipped venue. This could be the place of work, or more usually at an Agricultural College

6) **How long does it take?**
The test takes 45 minutes.

7) **Areas Assessed**
General competence with the computer as well as a choice between one of the three areas of Wordprocessing, Database (Datafile) and Spreadsheet.

8) **Conclusions**
The idea of the NPTC tests is a very good one; the testing of agricultural workers in practical skills that build up to a "Craftsman" status certificate (and an automatic pay rise of about £800). The tests are carried out at a suitably equipped work site or workshop by skilled practitioners from their own industry.

The concept behind this test is also very good. The practical tests are well thought out and based on realistic practical exercises (in this case, but not necessarily) in the application of computers to agriculture. The major drawback is that the test might be found to be too easy for many trainees. (This could be changed if the candidates were required to do all **three** options. This would perhaps

extend the test to a longer time than the designers thought reasonable). Although it would allow trainees for whom some of the other qualifications were too demanding to obtain an externally accredited certificate.

Having a CIT certificate that is easy is not a bad thing in itself. There are many YTS trainees whose practical understanding of computer applications and keyboard skills far outweighs their ability to communicate with words. The TV1 certificate is intended to be followed by TV2, which extends to the use of computers as information storing machines. It is unlikely that TV1 will become part of the Craft certificate scheme, but it is thought that a combination of TV1, TV2 and TV3 may be one of the options in the NPTC Craft scheme.

2.4 North Western Regional Advisory Council : 953 Computer Literacy.

1) **Name of Certificate**
NWRAC 953 Computer Literacy. This costs £5.20. The minimum course duration is 30 hrs off job training arranged at the discretion of the training provider.

NWRAC also have an Information Technology course 905 which is organised on a modular basis: each module taken as representing a suggested 20 hrs of work, with not less than 15 hrs "hands on" experience.

2) **Type of Assessment**
Centres devise their own continuous assessment scheme which must be submitted for approval by one of the Council's assessors. The courses should be continually assessed (with a total assessment time of 2 hrs or 10%) and should ensure that the students will have covered the required areas. The assessment scheme may contain projects, assignments or worksheets. Some factual information is required, and these are best examined using short tests.

3) **Accuracy Required.**
This can vary with the assessment procedures for each centre, but a percentage score is required for each student's performance. The assessment percentages are combined and candidates with more than 40% qualify for the award of the certificate. A credit grade is awarded to candidates with 55% to 69% and a distinction to candidates with more than 70%

4) **Who does the Assessment?**
This is done by the trainer. The whole assessment procedure is overlooked by a NWRAC/UCLI appointed Assessor. Centres submit samples of work (12% of candidates or at least 3) drawn from the top, middle and bottom. These are accompanied by mark sheets showing percentage marks awarded to each student.

5) **When and Where?**
Training and assessment takes place at the normal training place. NWRAC has expressed a willingness to accommodate in the assessment scheme procedures for assessment of "on the job" training.

6) **How long does it take?**
The course has a minimum duration of 30 hrs with assessment taking up 2 hrs of this time.

7) **Areas Assessed**
Five areas are offered (specifically excluding programming), the student is expected to have an in-depth knowledge of at least two of them to satisfy the assessment requirements. It is expected that the applications of these areas will be chosen to reflect the trainees occupation.

a) Text editing: which could include wordprocessing. The student is expected to be able to prepare and alter text.

b) Database: may either be in existence or created. The student should be able to interrogate and amend.

c) Spreadsheets: The student should be able to use a spreadsheet to perform common arithmetic operations on rows and columns.

d) Graphics: This can be based around a CAD package or "Turtle graphics".

e) Control functions: Illustrating data input, processing and output.

8) **Conclusions**
This course (953) seems a very flexible course for the accreditation of CIT. The assessment and the syllabus of the course are very much at the discretion of the training provider, although they must be submitted for approval by NWRAC. This flexibility allows for training providers to develop directly relevant courses for their trainees. This provision, however, can be a highly complicated business and may prove to be too difficult for some training providers. (Training consultants are usually available to help with this process and,presumably, NWRAC have an advisory system for providers).

The levels of skill required in each of the areas is not high (eg not even demanding the use of wordprocessing programs). The knowledge base is concerned with "terminology" and as such it is not obtrusive.

The 905 scheme can be seen as an extension of the 953 course (the 953 course is not a necessary precursor to the 905 scheme.) where most of the topics are developed in depth.

The 905 course is modular, (including modules in programming, business computing and file handling) with a certificate on which is specified the modules that the student has achieved a better than 40% score.

2.5 Cambridge Information Technology.

1) **Name of Certificate**
University of Cambridge Local Examination Syndicate: Cambridge Information Technology.
Annual accreditation fee £25
Module certification fee of £2.50 for first module, £2.00 thereafter.
Fee for final certificate in Information Technology (after certification of five modules)

2) **Type of Assessment**
The assessment tasks are normally set up by the usual supervisory staff. The handbook supplied for each module contains detailed assessment objectives (amplified by assessment notes).

Staff are required to complete "Student Assessment Records", in the form of lists of completed objectives. The record and assignments must be kept so that they can be sent to the syndicate for certification.

The assignments will moderated by the syndicate before a certificate is issued and possibly a visiting assessor will come to the centre to inspect the conduct of the scheme.

3) **Accuracy Required.**
Some of the assessment is by observation by the supervisor of performance in a practical context(eg those areas concerned with use of correct technical terms.)

For practical tasks performed at a keyboard 100% accuracy (without time limit) is required for tasks involving at least 500 characters.

For the optional "keyboard skills" assignment in the Computer Literacy module (001), 99% accuracy is required on 4500 characters over 6 minutes.

4) **Who does the Assessment?**
The assessment is usually done by the normal supervisor. When the supervisor is satisfied that a student has successfully performed an objective without assistance they record the date and initial the record and record any other relevant information at the same time. Specific assignments have to be kept so they can be dispatched for inspection by UCLES.

5) **When and Where?**
The training and assessment take place at an "accredited centre". Accreditation must be applied for annually and covers such matters as the nomination of a co-ordinator, provision of resources and the modules they wish to certificate.

6) **How long does it take?**
The modules are competence based so no particular length is specified. Each module is reckoned to take about 25 hours. This figure can be expected to vary widely as some of the modules are based on pre-experience of the material in other modules and will consequently take longer if they are taught in isolation.

7) **Areas Assessed**
These modules are available :-

001 Computer literacy (optional keyboard skills)
101 Wordprocessing
102 Spreadsheets
103 Databases
104 Videotext and Information systems
105 Programming
106 Computer control technology
107 Micro-electronics

Each of the modules has an introductory section in the 001 Computer literacy module.

eg 001 Computer Literacy:

i. Recognise the nature of a computer system.
ii. Connect, initialise and close down a computer system.
iii. Use a systematic method for the identification and documentation of files.
iv. Take due care of equipment and media.
v. Practical appreciation of the nature of a computer program.
vi. Appreciate the range of computer applications including a computer controlled external device, at least one applications package simulating a commercial activity and computer communication with an information source.).

8) **Conclusions**
The course booklet contains clear instructions for the implementation of this course. The content of the 001 (Computer literacy) course has some unusual, but praiseworthy, features: the emphasis on the documentation of files, the recourse to program manuals for guidance, the specification of computer control elements, communication with an information source.

The major drawback of the scheme is that it has a very limited practical emphasis (industry applications taken in 001 Computer literacy as "short written descriptions of a

total of four applications" where "wordprocessed descriptions are welcome.") The knowledge based objectives are substantial but seem in the main to be names of items or processes.

Another drawback for its use in YTS training is concerned with the assignments based on the preparation of written summaries, diagrams etc. For certain situations (eg a school with limited access to computer equipment etc) both of these constraints could be seen as advantages.

2.6 Pitman Examinations Institute: Information processing.

1) **Name of Certificate**
PEI Practical Wordprocessing : Elementary, Intermediate.
PEI Practical Dataprocessing : Elementary, Intermediate.
Each examination costs £3.40. There is a £10 fee for the registration of the centre. This covers four years.

2) **Type of Assessment**
The Pitman Examination Institute provide graded series of practical examinations in word and data-processing. The practical examinations consist solely of realistic "in tray" (clerical) assignments. These examinations are performed under the supervision of an invigilator and the specialist tutor. The completed results are then sent back to PEI for marking.

Competence in some of the test objectives (eg correct storage and retrieval of documents.) are certified by the specialist tutor.

3) **Accuracy Required.**
The wordprocessing examinations are designed for candidates who are expected to have an accurate copy-typing speed of 25 wpm. The accuracy required for the "intermediate" level wordprocessing test is set at 98.5% for a pass grade and 99% (with no more than 4 errors) for a first class pass. The accuracy for the other tests are not explicitly stated in the regulations.

4) **Who does the Assessment?**
The assessment and marking of the tests is the responsibility of the Pitman Examination Institute. Some of the practical competences are attested by the specialist tutor.

5) **When and Where?**
The examinations can take place at any time. PEI need 3 weeks notice of an examination. The examination takes place under the auspices of the "Registered Centre".

A "Registered Centre" is either a publicly approved centre for training (eg a school, college or an Approved Training

Organisation (provisional)) or a private provider. Both types have to satisfy PEI (eg by means of references) as to their ability to perform the examinations according to the regulations. The private provider would have to provide an external invigilator (approved by PEI) for the examinations.

6) **How long does it take?**
The "elementary" level examinations take an hour with five minutes "reading time". The "intermediate" examinations have a one and a half hour time limit. This does not include "printing" time.

PEI recommend that the candidates receive at least eight hours of instruction in the use of the data-processing program before the examination.

The specialist tutor has to do quite a lot of preparation work in advance of the examination to set up the files and the documents.

7) **Areas Assessed**

Practical Wordprocessing (Elementary) covers the areas of text creation, text revision, putting variable information in a standard document and simple proof reading (against a given perfect copy).

Practical Wordprocessing (Intermediate) includes the above but is extended to include tasks that require setting up "acceptable" formats, proof-reading (without a "perfect copy" to work from.), search and replace etc

Practical Dataprocessing (Elementary) tests the ability to transcribe information from source documents on to standard data entry forms, then to create new records, delete records, amend records, select a set of records and print records; all using a computer system with an existing datafile of records.

Practical Dataprocessing (Intermediate) involves an appraisal and setting up of a database from information given, selecting and sorting the information using two or more criteria, and printing results in response to requests for information.

8) **Conclusions**
The name "examination" makes these sound artificial and formal, but in practice these examinations, with their emphasis on carefully graded and realistic "in tray" exercises, offer a very good pattern of certification of CIT in a YTS scheme oriented to clerical trainees.

The fact that PEI do the marking for these tests (as opposed to the perceived complications of keeping records of "competences" etc) is seen as a great advantage by the users of this certification scheme.

Course content seems well planned and the approach (ie using pre-prepared text and data files, "in tray" tasks etc) seems very forward looking.

A major limitation for non-clerical candidates seems to be the "25 wpm" copy typing requirement.

PEI have under development other practical examinations in the areas of "Practical Spreadsheet applications" and "Practical Computer Communications" (Involving queries to PRESTEL, CEEFAX type information systems. Some of these may be done with simulated information.)

Appendix 3

Developments in Open Learning of potential relevance to YTS

"Open Learning" has been defined in a number of different ways, but Lewis highlights 3 aspects (Open Learning, volume 1, number 2, 1986):

- open learning is learner-centred, rather than institution-centred;
- open learning implies the use of a wide range of teaching/learning strategies
- open learning is about removing restrictions (`barriers') to learning, particularly those barriers inherent in conventional education/training provision.

Lewis considers "the last of these, the removal of barriers, has been particularly influential and has shaped the MSC`s Open Tech programme". The thrust of the Open Tech programme was aimed at supervisory technician and managerial staffs. Hence only limited material would be suitable for YTS trainees (not least because they had been designed with a different audience in mind), although some may be of interest to YTS supervisors, tutors etc.

However, some comment is relevant because potentially open learning methods could be used to overcome a number of "problems" with CIT in YTS (notably differing levels of CIT experience and, for umbrella schemes, a variety of applications relevant to the trainees industry). It should be remembered that open learning is perhaps best conceptualized upon an open-closed learning continuum (see R. Lewis and D Spencer: "What is Open Learning" CET, 1986), rather than being identified with particular methods or products.

With this proviso in mind, comment will be made upon the use of Open Learning in a CIT context. There are many areas in which Open Learning would be a very good solution, for example in relation to development of core skills and occupational competence. For any useful work in CIT, the trainee must have a computer available (this could be a terminal or a micro).

1) **Extension Activities**
In `off the job" training, it is quite possible to have trainees that have either been through the material before (perhaps at school) or who are bright enough to get through the work in a very short time. It would be useful to have Open Learning material available too. Open Learning tasks should require the minimum of trainer intervention, allowing the trainer to concentrate on the weaker trainees.

2) **On Job**
Open Learning could be very useful as a part of a properly set up training programme. The trainee could have regular time allocated to an Open Learning program, or spend "spare" time working upon it. Why "properly set up"? Most busy supervisors, especially those with a training responsibility, often find themselves in a situation where they have no particular task for the trainees to perform

under supervision, but on the other hand they have a lot of paper work to do. It would look like a very good solution to send the trainees off to work in the open learning room. The trainees would catch on fairly quickly that they were being asked to go and lose themselves for half an hour or so.

3) **Reinforcement**
Trainees who have their CIT training organised as a "block" often have forgotten everything about computers within a few months (LANAC report on provision of CIT in their area). In such cases it would be possible to set up an "Open learning centre" in the normal training area that has computer equipment and programs, as well as open learning material, available. The regular use of familiar equipment and programs would be of great value in reinforcing learning.

For example, the trainees could use wordprocessing programs to keep diaries, records of competences overtaken,spreadsheet programs to record their travel allowance etc. One question that must be settled is how is the expensive computer equipment going to be supervised? All Open Learning schemes will "leak" to the extent that the student will need help from a tutor or trainer at some points. This would however be expensive in trainer time, as there may often be small groups working at odd times.

Review of Open Learning materials available for YTS/CIT.

Here is a brief review of some of the materials and approaches available for the use of open learning in the context of YTS.
The development of good materials will be a gradual process. Producing a course in an open learning format is regarded as being "ten times more difficult" than the production of the same course in a classroom. These views were expressed by the staff of TELTEC and OPTIS, but were subscribed to by most of the other producers of materials.

Telford College has worked in the area of Open Learning for several years. They offer a variety of courses including some computer courses. Some of the courses are Scottish O Grades others are SCOTVEC 16+ modules. They organise their courses so that the student has contact with the tutor once or twice a term and the material for the course is sent by post.This has considerable advantages for the shift worker but it is regarded as unsuitable for young people because of the rival attractions for their spare time. Another interesting development is the establishment of an **Open Learning Centre.** This will provide a place where students can "drop in" and use computer equipment as

well as a growing library of software and open learning packages. The centre will be supervised and some guidance will be available.

TELTEC, another development at Telford College, provides open learning packages in the New Technology area. Some packages are available for CIT, these being the introductory computing modules from SCOTVEC. These are thought to be useful in upgrading the skills of the training supervisors for YTS courses.

OPTIS (whose work is highly regarded) and the **Open Tech** are developing an interest in the CIT area. They already have a range of open learning packages available for training trainers in the other core skills areas.

LANAC (Leicester and Northamptonshire Accredited Centre) have piloted material for YTS trainers. One development of interest is the Electronic Learning Machine (ELM) which is a supposed to be a cheap "interactive audio" device for computer based instruction. It is based around a stereo cassette recorder, with one of the tracks providing the audio instructions, the other providing the data for the computer.

COTU (Coventry Open Tech Unit) has developed some CIT modules for wordprocessing and other business applications programs.

Guildford Educational Services offer a package on Wordwise and may soon have other packages available.

National Extension College do a variety of CIT correspondence courses but all of them seem to be based on a "Computer Studies " approach (ie with an emphasis on programming and knowledge.)

Austin Rover produce open learning courses in CIT but these seem biased towards programming and computer literacy. Their course is available on the Apple computer. They also have Open Learning centres on-site at some of their major plants. Other large companies (ICI, BSC etc.) have sponsored similar developments.

Office Technology Unit at the Polytechnic of the South Bank Produce courses in Spreadsheet applications, Wordprocessing and Dataprocessing based on the Gemini software.

The central directory of Open Learning materials (MARIS)

It is often difficult to find out about relevant Open Learning material for particular applications. It was thought that a central directory of Open Learning material would be very useful for trainers. **MARIS** provide an information service (on the same lines but with more advanced features than PRESTEL) that provides information about the availability of open learning and distance learning material. You can set up "key" searches to abstract information about a particular topic and level. To call up the MARIS net you need roughly the same system as you would use to contact PRESTEL.

From the Maris database you would get the contact address for the material you were interested in, and then contact them in the normal way.

(For example: A search with the key word "training" and the medium of "computer program" produced 49 titles.)

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Developments in Computer and Information Technology Education and Training surveys a number of curricular developments in Computer and Information Technology (CIT) and assesses their significance for the CIT component of the Youth Training Scheme (YTS). This report is the first in a series of reports published as outcomes of a project exploring issues of good practice, accreditation and progression in CIT for 13 - 19 year olds in general and for the Youth Training Scheme in particular.

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